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ABSTRACT

This instructor's resource guide is designed to accompany the student modules in the occupational subject area of technical education. The guide defines safety and health training needs in the various occupations; describes the modules and their use; and encourages instructors to consider the safety and health needs of all students. In Section I some common safety and health problems in the occupational area of technical education are cited. Section II provides the instructor with a short narrative of the content of each related student module. The third section identifies the basic components (introduction, objectives, subject matter, activities, references) of the 50 student modules in this program and describes the function of each of the various parts. Followup activities and module format are also described, and presentation approaches are suggested. In Section IV, a brief summary of some of the considerations of special-needs students is given. The final section concerns student certification procedures. Appended is a list of the 50 module titles. (CT)

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SAFETY AND HEALTH FOR TECHNICAL EDUCATION

AN INSTRUCTOR RESOURCE GUIDE

Developed for
THE U. S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION

Developed by
THE CENTER FOR OCCUPATIONAL RESEARCH AND DEVELOPMENT
(Formerly Technical Education Research Center – Southwest)
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CE 031 456

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PREFACE

In the 40 minutes required to read and study this Instructor Resource Guide, one worker somewhere in the United States will be fatally injured in an on-the-job accident. More than 160 workers will have suffered disabling injuries, and several million dollars will have been spent or lost as a result of these deaths and injuries. In addition, at least 344,000 cases of occupational disease are reported annually among the 75 million emloyees in the labor force.

Because a majority of job-related accidents involve workers within their first six months of employment, safety and health information should be provided during preemployment training. Unnecessary exposure to potential health hazards can be minimized if proper training is provided. Health and safety information, the development of a positive safety attitude, and safe working procedures should be part of the curriculum for every vocational or occupational student. This can be accomplished by providing a separate health and safety course or, more easily, by infusing the information into appropriate, existing classes.

A series of separate instructional modules have been developed to facilitate the process of including safety and health instruction in existing curricula. Modules in the series that are appropriate for occupations in Technical Education have been identified in this Resource Guide, which is one of seven related to different occupational clusters. The modules are adaptable to secondary, postsecondary, and adult education programs, including industry-based training and retraining programs.

The purpose of this Instructor Resource Guide is to familiarize you, the instructor, with the instructional materials developed and to suggest a systematic method for their use. Health and safety needs for the Technical Education cluster will be described in Section I, including a definition of the cluster. The modules recommended for inclusion will be described in Section II. Various ways to use the modules are found in Section III. The fourth section describes mechanisms helpful in identification of special safety and health considerations for handicapped students/workers. The final section provides information concerning certification of students who successfully complete a training program that includes these modules.

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INTRODUCTION

When someone is asked to perform a new job, some form of training or instruction normally is provided. The training may be as brief as a few seconds of verbal directions or as extensive as months of intensive academic and apprenticeship preparation. The number of workers who annually sustain job-related disabling injuries and illnesses indicates that safety and health information may not be adequately presented in many training programs.

Safety and health information often is acquired only as a by-product of job-related responsibilities. In many cases, observation of experienced co-workers may be the only mechanism provided for training. This uncontrolled type of learning frequently leads to development of improper or unsafe work practices by the new worker. If the new employee does not possess a basic understanding of safety and health aspects of the job and a positive safety attitude, the potential for an on-the-job accident is greatly increased.

Technical Education includes courses of instruction that cut across several occupational clusters. Various program areas are grouped by cluster relevance and include:

- Engineering-related Technology (16 program areas).
- Agriculture-related Technology (four program areas).
- Health-related Technology (four program areas).
- Office-related Technology (two program areas).
- Home Economics-related Technology (six program areas).

Those people working in an occupation as a result of training received in one of these program areas occupy a position somewhere between the skilled craftsman and the professional person such as a doctor, engineer, or scientist. Technicians in each of the five categories listed above are subjected to many of the same hazards experienced by other workers in their clusters. In addition, the technicians' roles as assistants to some person performing research frequently exposes them to equipment and procedures that have no standard safety precautions established. One of the most common

injuries for this cluster is back injury resulting from improper lifting techniques. Back strains can affect a worker for the remainder of his or her life. Safety and health instructional materials are needed for the Technical Education cluster that address these and other specific problems.

In response to the need for safety and health instruction, the U.S. Department of Education sponsored a project to develop 50 safety and health instructional modules. Each module addresses a separate topic and is self-contained. The first ten modules in the series (SH-01 through SH-10) are referred to as "core" modules and contain basic safety and health information useful to almost every occupation in the Technical Education cluster. From the remaining 40 specific modules, 26 have been recognized as having content that may be appropriate for Technical Education students, depending on their vocational and occupational goals. A complete list of all 50 module titles is included in Appendix A. This "shopping list" of modules permits you to select the exact safety and health information your students need. The modular form of presentation allows you to infuse modules when and as they are appropriate in your instructional plan.

SECTION I
HEALTH AND SAFETY IN TECHNICAL EDUCATION

An automotive technician was performing tests on three highly volatile, alternative fuels in an internal combustion engine. He went out for lunch and forgot to close the fuel containers. When he returned the room had filled with fumes. As he entered the room, his cigarette ignited the vapors and an explosion resulted.

An electronics technician had the interlocks disconnected on a cabinet to repair a high-voltage power supply. He inadvertently left the power turned on when attempting to replace a rectifier board and received a severe electrical shock. By the time people in an adjoining room rushed in to investigate a noise that they heard, the technician had already lapsed into unconsciousness, and subsequently died from the accident.

An assistant in a chemistry lab was preparing for a titration demonstration to the class. She was not wearing safety goggles, and the acid used for titration splashed into her eyes, causing temporary blindness.

A technician aligning the mirrors of an operating Argon laser was looking directly down the laser bore. When the mirrors came into alignment, lasing occurred directly into one eye, causing permanent damage and partial blindness.

Many workers in this cluster are subjected to a variety of new and unusual situations during the experimental phases of their jobs. It is critical that each technician be aware of as many safety and health considerations as is reasonable before entering the workforce. A significant majority of accidents for these workers will occur within the first six months of their employment.

While you are providing many of these entering workers with job skills, why not also provide them with the safety and health instruction they need to survive their initial term of employment?

TECHNICAL EDUCATION PROGRAM AREAS

The Technical Education cluster includes a diversified group of occupations that can be classified in five program areas that include:

- Engineering-related Technology.
- Agriculture-related Technology.
- Health-related Technology.
- Office-related Technology.
- Home Economics-related Technology.

For the purpose of this Instructor Resource Guide, Technical Education has been separated into five instructional program areas. Each area will be described briefly, specific health and safety hazards listed, and some of the common employment groups and recommended modules identified. The modules are numerically sequenced, but numbers do not represent order of presentation. A summary of the recommended modules is included in Section II and a list of the 50 module titles is found in Appendix A.

The first ten modules of the JSHIM series (SH-01 through SH-10) are core modules and contain some information useful to workers in all occupations of the Technical Education cluster. Of the remaining 40 specific modules, those of which all or parts might apply are listed with each area.

Engineering-related Technology - Workers in this program area typically are trained to assist engineers as they perform experimental or practical tasks. At least 16 separate technologies have been defined as being part of this program area:

- Agricultural Technology.
- Architectural Technology.
- Automotive Technology.
- Chemical Technology.
- Civil Technology.
- Electrical Technology.
- Electronic Technology.
- Electromechanical Technology.
- Environmental Technology.
- Industrial Technology.

- Instrumentation Technology.
- Mechanical Technology.
- Metallurgical Technology.
- Nuclear Technology.
- Petroleum Technology.
- Scientific Data Processing Technology.

Many of these technicians will use tools relative to their trades. In some cases, they will conduct experimental activities, testing the limits or capabilities of a certain design. Standard safety practices may not be applicable because unique circumstances may prevail due to the experimental nature of the activity. It is recommended that you examine the entire list of modules for possible content for your specific group of students.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-15 Agribusiness Safety
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-34 Safety Guards for Machinery
SH-35 Ionizing and Nonionizing Radiation Protection
SH-37 Safety of Concrete, Forms, and Shoring
SH-38 Excavating, Trenching, and Shoring Safety
SH-39 Steel Erection Safety
SH-40 Electrical Power Transmission and Distribution Safety
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-45 Coast Guard Regulations Applied to Offshore Drilling
SH-46 Chemical Hazards and Waste Disposal Safety and Health
SH-50 Agricultural Chemical and Pesticide Hazards

Agriculture-related Technology - These workers normally are found as members of a team that includes skilled workers, the technician, and the scientist. At least four specific work areas can be identified. These areas include:

- Animal Science.
- Dairy Technology.
- Food Processing Technology.
- Plant Science.

These technicians work closely with agricultural scientists conducting experiments that involve plants and animals as well as products derived from them. Some hazards exist as a result of working with living organisms, other hazards result from exposure to chemicals and devices used in the breeding, care, and processing of plants and animals.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-15 Agribusiness Safety
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health
SH-50 Agricultural Chemical and Pesticide Hazards

Health-related Technology - Workers in this program area are required to have certain credentials before performing their duties. At least four job descriptions can be grouped in this area, including:

- Dental Hygienist.
- Electroencephalograph Technician.
- Radiologist.
- Registered Nurse.

A majority of these technicians work in hospitals, clinics, or medical and dental offices. Many of the same hazards to which other health occupations personnel are exposed affect workers in this area.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Office-related Technology - These workers combine scientific knowledge and methods with technical skills in support of office occupations. Persons in this area are part of an office team that includes the skilled worker, the technician, and administrative management personnel. At least two specific job categories can be identified: Computer Programmer and Systems Analyst.

Being confined to the office environment, the hazards that are common to all office workers also affect workers in this program area. The necessary safety and health training can be found in several modules of the JSHIM series.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Home Economics-related Technology - Persons working in this area have received specialized training in a given area of Home Economics. At least six job classifications can be defined for this area:

- Child Care Center Assistant.
- Children's Division Assistant (hospital).
- Teacher Assistant (primary level).
- Food Service Supervisor.
- Interior Decorator Assistant.
- Home Equipment Demonstrator.

These workers must contend with workplace hazards, but they also must be aware of proper safety and health for the children and adults whom they serve on a daily basis. Since contact with small children is involved in many of these occupations, workers must be acutely aware of hazards to minimize accidents.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Other job titles may be found in each of the previously noted program areas that may not have been listed. If you teach students who may assume one of the unlisted jobs, you may wish to examine the entire list of modules carefully.

SECTION III

SAFETY AND HEALTH MODULES FOR TECHNICAL EDUCATION

The great diversity of occupations in Technical Education makes it impractical to establish one safety and health program appropriate for all. To be useful then, any instructional materials for this group of occupations must be flexible enough to allow specific programs to be designed to meet individual student needs. Instruction utilizing modules has that flexibility.

The Job Safety and Health Instructional Materials (JSHIM) are packaged in a modular format. By definition, a module is considered to be a component of a larger entity. An instructional module is one that contains a discrete amount of information directly related to a specified set of instructional objectives. As an instructional module, it is also a component of a more complete instructional system. A complete example module can be found in Appendix B.

CORE MODULES

Because the JSHIM modules were designed with the intent of their being useful to many occupations in a variety of occupational clusters, two separate groups of modules were created. One group consists of ten modules classified as "core" modules. Safety and health experts consider these topics to be fundamental to almost every occupational cluster. The ten modules are numbered SH-01 through SH-10 and include the following:

SH-01 MATERIALS HANDLING

Manual and mechanical methods for lifting, loading, and transporting materials are discussed, including the use of various aids such as ropes, chains, slings, conveyors, overhead cranes, dock plates, and hand and industrial trucks.

SH-02 THE ROLE OF OSHA IN SAFETY AND HEALTH

The Williams-Steiger Act is discussed, including rights and responsibilities of employees and employers under the Act. OSHA inspections are described; record-keeping requirements explained; and company training programs discussed.

SH-03 FUNDAMENTALS OF ELECTRICAL SAFETY

Basic electrical terminology and principles are discussed so that common electrical hazards can be understood. Safety features of equipment and OSHA requirements designed to protect workers from electrical hazards are explained.

SH-04 FIRST RESPONSE TO MEDICAL EMERGENCIES

Medical emergencies occur daily and may happen to anyone at anytime. This module is designed to inform students of actions that should be taken to aid the victim of such an emergency until professional medical personnel arrive. First aid procedures are outlined for seventeen common medical emergencies.

SH-05 FIRE PREVENTION AND EMERGENCY PROCEDURES

Fire and emergency procedures for fighting fires are discussed. Codes and regulations related to fire safety are explained. Fire detection and protection devices are also described.

SH-06 WALKING AND WORKING SURFACES

Many job-related accidents are caused by falls on or from such work areas as floors, stairways, exits, ladders, and scaffolds. Safety precautions and regulations governing these surfaces are described.

SH-07 SAFETY SIGNS, LABELS, TAGS, AND COLOR CODES

A uniform system of signs, labels, tags, and markings is used to warn against a wide range of hazards. Specifications, including size, color, and purpose, are given for signs that indicate danger, caution, exits, directions, biological hazards, traffic, and safety instructions.

SH-08 RECOGNIZING JOB HEALTH HAZARDS

Chemical, physical, and biological health hazards are discussed, including contamination, effects, and protective mechanisms.

SH-09 RECOGNIZING JOB SAFETY HAZARDS

Employer and employee responsibilities in the recognition and correction of job safety hazards are delineated. Common safety hazards per-

taining to fire, machine guards, electrical equipment, apparel, tripping, housekeeping, and lifting are described.

SH-10 STRUCTURAL EGRESS AND EMERGENCY PROCEDURES
Egress requirements are given and discussed, including specifications for exits, illumination of exits, and provisions for fire, smoke, fumes, and panic. The importance of emergency plan procedures and their implementation is stressed.

SPECIFIC MODULES

The remaining 40 modules contain information useful to at least one but less than all of the seven occupational clusters. Twenty-six of the 40 specific modules have been selected as being useful for the Technical Education cluster. The following descriptions provide some insight into their content:

SH-11 BUSINESS AND OFFICE SAFETY
The number and types of business and office injuries are presented. Office safety hazards and their control are discussed. Fire and health protection are described.

SH-12 PERSONAL PROTECTIVE EQUIPMENT
The student is instructed in the selection, use, and care of personal protective clothing and equipment, including safety helmets, hearing protectors, face and eye protective equipment, respirators, safety belts, and protective clothing and footwear. OSHA requirements governing protective equipment are reviewed.

SH-13 INDUSTRIAL SANITATION AND PERSONAL FACILITIES
Industrial health and sanitation encompass the areas of water, sewage and garbage, personal facilities, food services, and heating and ventilation. Terminology relating to and regulations governing these areas are given.

SH-14 USING ROPES, CHAINS AND SLINGS SAFELY
This module discusses in detail the use, care, inspection, and maintenance of fiber ropes, wire ropes, chains and slings. OSHA regulations

and consensus standards relating to this equipment and its use are presented.

SH-15 AGRIBUSINESS SAFETY

Agribusiness is defined, and the rationale for agribusiness safety standards is given. Safety guidelines are presented for use on the farm and for machinery and equipment installed by the agricultural industry.

SH-16 MATERIAL HOIST SAFETY

Safety features for inside and outside material hoistways, and for material hoist platforms are described. Hand-operated crain hoists, electric hoists, and air hoists and their safety features are discussed.

SH-19 SAFETY WITH HAND AND PORTABLE POWER TOOLS

Tool control for hand and portable power tools is discussed. The types of hand tools are presented, and their care is described. Hazards, handling procedures, and safety devices of various portable power tools are discussed.

SH-22 LADDER AND SCAFFOLDING SAFETY

Types of ladders and scaffolds are described, as are their use and maintenance. OSHAct requirements and specific safety rules are discussed in detail.

SH-24 MACHINE AND WOODWORKING TOOL SAFETY

Boring, turning, milling, planing, grinding, and woodworking machines are described, listing common causes of worker injury. Safety rules and protective devices and equipment as they relate to machines and woodworking equipment are presented.

SH-25 SAFETY FEATURES OF MATERIAL AND PERSONNEL MOVEMENT DEVICES

Topics discussed include safety features and practices for such devices as conveyors, lift trucks, motorized hand trucks, aerial bucket devices, elevators, escalators, moving walks, and man lifts.

SH-26 SAFETY FOR COMPRESSED GAS AND AIR EQUIPMENT

Compressed gas cylinders can be extremely dangerous if not handled carefully. This module discusses regulations and general safety considerations for handling, storing, and using these cylinders and related equipment such as manifolds, outlet headers, regulators, hoses, hose connections, and torches.

SH-28 WELDING, CUTTING AND BRAZING SAFETY

Gas and electric welding are discussed, with emphasis on specific safety precautions and regulations governing each.

SH-29 HAZARDOUS MATERIALS SAFETY

General characteristics of combustible, flammable, explosive, poisonous, and corrosive hazardous materials are discussed, with special emphasis on compressed gases, flammable and combustible liquids, combustible solids, explosives, radiation, and corrosives.

SH-30 SAFE HANDLING AND USE OF FLAMMABLE AND COMBUSTIBLE MATERIALS

Properties and classifications of flammable and combustible materials are presented, with safety measures to be taken in the storage, transportation, and use of these materials. Special emphasis is placed on liquefied petroleum gas.

SH-31 OVERCURRENT AND ELECTRICAL SHOCK PROTECTION

Basic electrical terminology and specific methods for grounding techniques to prevent electrical shock are reviewed. Overcurrent circuit interrupters and their use are discussed in detail.

SH-33 VIBRATION AND NOISE CONTROL

A definition of noise, measurement techniques, parts of noise problems and best method of control procedures are outlined in this module. Personal protective devices and maximum exposure limits are described for various workplace conditions.

SH-34 SAFETY GUARDS FOR MACHINERY

The importance of machine guards is explained. Guard types, specifications, and maintenance are detailed, and practices for employees working with guarded machinery are described.

SH-35 IONIZING AND NONIONIZING RADIATION PROTECTION

Radiation comes in many forms and can have a wide range of effects on personnel exposed to it. Specific health concerns are detailed, as well as regulations established for protection against each type of hazard.

SH-37 SAFETY OF CONCRETE, FORMS, AND SHORING

Personal protection for personnel working with concrete is discussed. Other topics include reinforcing steel placement, bulk concrete handling, concrete placement, shoring, and tilt-up construction.

SH-38 EXCAVATING, TRENCHING, AND SHORING SAFETY

Excavating, trenching, and shoring are defined. Excavating and trenching hazards such as soil structure, utilities, weather conditions, superimposed loads, and vibrations are discussed. Safety precautions and policies for excavating, trenching, and shoring are described including means of supporting excavations, precautions against the weather, and inspections.

SH-39 STEEL ERECTION SAFETY

Basic equipment for steel erection is introduced, and operations and equipment are discussed. Erection during plant operations is also discussed, and safety practices are described. Lateral bracing is discussed. Requirements for temporary flooring are presented.

SH-40 ELECTRICAL POWER TRANSMISSION AND DISTRIBUTION SAFETY

Prework inspections, protective equipment, grounding, guards, tagging, and signs required for electrical power transmission and distribution safety are discussed. Safety precautions for working at night or near water are outlined. Tools and protective equipment are described. Mechanical lifting equipment, material handling, and underground lines are also discussed. Medical and first aid precautions are described.

SH-44 EXHAUST, DUST COLLECTION, AND VENTILATION SYSTEMS

Types of exhaust, dust collection, and ventilation systems are described, as well as their functions, use, and effectiveness.

SH-45 COAST GUARD REGULATIONS APPLIED TO OFFSHORE DRILLING

Coast Guard regulations applied to offshore drilling are discussed, including special safety rules, ventilation requirements, worker requirements, use and safety requirements for rails, safety requirements for helicopter facilities, fire extinguishing systems and required tests, drills, and inspections. Miscellaneous safety equipment and special procedures are also described.

SH-46 CHEMICAL HAZARDS AND WASTE DISPOSAL SAFETY AND HEALTH

Chemical hazards are introduced, and types of chemical hazards and safety precautions for working with chemicals are discussed. Ventilation of areas, chemical toxicity, specific chemical hazards, and waste disposal for chemicals are included.

SH-50 AGRICULTURAL CHEMICAL AND PESTICIDE HAZARDS

Agricultural chemicals and pesticides are defined. Hazards, first aid, and protection for eye contact, skin contact, inhalation, and ingestion of pesticides are discussed. Safe handling and storage of chemicals and pesticides are described.

While each module has been assigned a number in sequence, there is no implied priority of presentation. Each module is fundamentally self-contained, allowing most to be used without regard to any numerical sequence. There are no prerequisites for the modules.

SECTION III

MODULE DESIGN AND USE

Each of the 50 JSHIM modules contains the following components:

Introduction - A synopsis of what is presented and why.

Objectives - Measurable objectives that relate to the content of each module are presented, and the objective's page location in the subject matter is noted.

Subject Matter - For most modules, this consists of 20 to 25 pages of content, with all content related to one of the stated objectives.

Activities - Following each portion of subject matter related to an objective is a question for the student to answer as an indication of mastery of that objective.

References - Suggestions for supplementary information.

An example module complete with all components may be found in Appendix B.

The basic content of each part will vary with the different modules, but its purpose and function remain the same. It is recommended that each section be considered when using a given module.

Exact usage techniques may be as varied as the individual instructional approach. Some basic hints, however, may be helpful in identifying some of the various ways in which they can be used. Each module is basically self-contained and could be used in a self-study or self-paced format. However, the optimum method of use is for the modules to be presented by an instructor using the module as a student study guide. Prior to assigning the module, examine the objectives to determine that all content is appropriate for your students. If certain content or objectives are not relevant, advise your students that they will not be held responsible for those sections. In addition, you should provide appropriate activities that will allow your students to practice proper safety and health procedures. Some follow-up activities include:

- Round-table discussions with students or adult groups in the workplace.
- Requiring verbal or written reports related to a single objective or a recent accident from newspaper articles.

- Developing or adding to a job safety and health bulletin board.
- Performing an in-house health and safety hazard survey of the classroom or other facilities.
- Guest speakers from the community, including such people as: Accident victims or their relatives, or people responsible for safety, such as firemen, policemen, or safety engineers for government and private industry.
- Field trips to workplaces similar to those the student will encounter.
- Having local emergency rescue units demonstrate their procedures and discuss problems.
- Constructing simulations that allow students to model or role play circumstances in safety and health.
- Putting health and safety information articles and information in a local or school newspaper.
- Promoting student involvement in local and national safety organizations.

One of the most significant responsibiiities of a vocational or occupational instructor is to foster a positive student attitude toward safety and health. The activities listed above should help to build this positive attitude. Your effectiveness in establishing this attitude can be measured by student comments and actions. If you observe safety being willingly practiced in day-to-day activity you can be reasonably assured that a proper attitude has been developed.

Emphasizing your commitment to safety and health by setting the proper example is critical. Properly practiced safety rules will not only reduce work accidents, they also will decrease the possibility of classroom accidents and subsequent instructor liability. Your actions and attitudes toward safety and health will be carefully observed and copied by many students. An example is a situation in which activities dictate that hard hats be worn by all present. If the instructor tells all the students to wear hard hats but chooses not to do the same, students are likely to feel that it is actually unimportant or perhaps childish to wear a hard hat. Similarly, if the attitude of the instructor is conveyed by "I know they are uncomfortable and look weird, but put them on anyway!" a less than positive attitude will prevail. Regardless of the method used to convey safety and health information or the conviction with which it is presented, if it is

not being practiced in the learning environment its credibility will be lost.

Use of accurate, pertinent, and easily understood educational materials is a second way to promote a proper safety attitude. The Job Safety and Health Instructional Materials modules can be used as a source for making transparencies of illustrations, tables, or charts that can be used as teaching aids. Other supplemental information or aids can be found in the Reference section of each module. Modules are organized in a format that permits maximum flexibility and makes them suitable for use by instructors in almost any occupational or vocational area.

Two fundamental methods of presentation can be practiced in safety and health instruction. One method is to organize a separate and distinct safety and health course for students in one vocational area. An advantage of this approach is uniformity of the content presented to each student. Specifically allocated time frames for safety and health instruction are available when using this technique.

A second approach is to insert the safety and health instruction into existing training programs on an as-needed basis. This would benefit instructional programs that have only limited time and/or facilities available for training activities. Additional advantages are realized by the ability to present the exact content desired when it is most relevant to the student's training cycle. For instance, the best time to present information about selecting proper personal protective equipment is immediately before the student needs the information. More specifically, if the student were about to perform a task that required wearing a respirator, the section concerned with respirators of Module SH-12, "Personal Protective Equipment," would be most appropriate.

Modules SH-01 through SH-10 are considered core modules, and they have been recommended for use by all Technical Education instructors. Much of the content presented in those first ten modules is basic enough that you might wish to present them as a unit at the beginning of the course. This does not mean that each objective of the ten core modules must be presented; you may select those that are appropriate for your instructional sequence.

As a mechanism for determining the level of previously acquired safety and health knowledge and skills, formative pretests can be conducted. Student activities found in the modules can be used, or separate instruments or procedures devised.

As each module contains distinct subparts relative to each objective, you have the option to present only that part (or those parts) of the module useful to your students in that specific instructional setting. If, at another point in their training cycle, additional information is needed from that module, the additional content can be studied without loss of continuity. Student retention and interest will be enhanced when the principles have an obvious and direct relationship to activities being performed.

If a group presentation format is used, visuals found in the modules can be made into overhead transparencies for ease of discussion. Other sources of safety and health information and mediated materials for Technical Education can be found in a special "State-of-the-Art Report" prepared for the JSHIM project.

SECTION IV

SPECIAL–NEEDS STUDENTS IN TECHNICAL EDUCATION

The Civil Rights Act of 1964 and the Rehabilitation Act of 1973 placed responsibility on the employer to set goals and timetables - and to prepare guidelines for affirmative action - that include employing the handicapped. As a result of these legislated acts and a growing need for more labor trained in vocational areas, increasing numbers of students with special needs are entering vocational training programs. To satisfy these requirements and ensure that special-needs students have an equal opportunity to be "mainstreamed" into the labor force, certain attitudes and actions must occur.

Many classification schemes are used to categorize handicapped workers and individuals. Those students and workers with physical handicaps usually can be divided into three groups. The three groups include those with:

- Hearing impairments.
- Visual impairments.
- Orthopedic impairments.

Some special consideration should be recognized if you have one of these students in your training program.

A deaf or hearing-impaired student will have difficulty reacting to verbal cues such as warnings or directions. For example, a fire starting in a storeroom of a laboratory, near the only exit door, could cause escape problems for the hearing impaired if an audible alarm is the only warning. Emergency alarm systems should be equipped with easily visible, flashing lights even in home settings. As an added precaution in a workplace, it is advisable to assign someone to help the worker identify the existence of an emergency or pending danger.

The visually-impaired or blind student may have no difficulty in hearing warnings, but may have difficulty in leaving an area if unknown obstacles are present. These workers normally adapt quickly to their surroundings and, provided that no furniture, machinery, or materials are blocking the path, they can move to safety in an emergency. Warning labels on haz-

ardous materials containers should have braille interpretations or should be identified for the student. Storage of hazardous materials in an appropriate cabinet may also prevent accidental use of an unknown chemical.

Orthopedically-impaired workers may require structural or mechanical modifications to the workplace, depending on the type of handicap. Those confined to wheelchairs may need ramps for moving from one level to another. Aisles should be clear, and wide enough to permit easy movement. If wall-mounted tools or switches are to be used, either they should be within easy reach, or adaptations should be made for their use. Other types of modifications may be necessary for other orthopedically-impaired workers.

Most students and workers with permanent handicaps have learned to compensate for their "apparent" handicaps. Many can accomplish amazing feats in spite of what we perceive as insurmountable odds. Development of a positive attitude concerning the ability of these students to function in the workforce is extremely important.

An attitude must be developed that includes caring, understanding, and the belief that handicapped workers are capable of achieving exactly what you believe they are capable of achieving. Some special consideration may be required, perhaps including increased time and practice, to master certain activities. In some vocational programs Individualized Educational Plans (IEPs) documenting specific training programs for individual students have been used to identify the exact need.*

Each state provides special resource people to assist vocational educators with designing programs and suggesting techniques for training the handicapped student. Other state and local agencies such as those involved in rehabilitation may provide local support. Some individual schools provide professionals and paraprofessionals who move around to assist handicapped students in vocational classes containing nonhandicapped students.

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*Conaway, Charlotte. "Vocational Education Serves the Handicapped." Voc Ed, Vol. 56, No. 3, April 1981, pages 22-25.

These persons can act as tutors, translators, facilitators, or whatever is needed to help the handicapped student successfully complete the training program.

Two other considerations should be recognized by instructors and employers. Structural accommodation and nonhandicapped employee awareness programs are both key factors for a safe and successful employment program of the handicapped.

Structural accommodations should include only those modifications necessary to allow safe movement of the handicapped employee. One of the most obvious examples is the need for ramps for use by wheelchair-bound employees.

Employers should also be encouraged to develop awareness programs for their nonhandicapped employees. These programs should encourage fellow employees to understand that the handicapped worker is expected to perform the assigned duties without placing an additional burden on other employees.

All four of the previously identified program areas in Technical Education contain occupations that could be filled by handicapped employees. Some of these workers have special needs unrelated to physical handicaps, including the need for assistance in understanding the English language. Being unable to read basic warning labels and signs poses added dangers for these workers. Instructors and employers should develop programs to eliminate this problem. The use of international symbolism in signs is a fundamental help in that attempt.

If these suggestions are considered, handicapped or special-needs workers can successfully complete a safe and meaningful vocational program. And they can become productive and safe members of the labor force.

SECTION V
SAFETY AND HEALTH CERTIFICATION FOR STUDENTS

Traditionally, when a person satisfactorily completes a course of instruction, some recognition is granted. Often the recognition is in the form of a certificate issued by the institution or organization responsible for the instruction. This certificate becomes an official symbol displayed with pride by the recipient. A Safety and Health Certificate is particularly important to the new employee and the employer if it implies that the employee has demonstrated an understanding of the basic safety and health aspects relevant to the particular job.

Most employers are aware that documented safety and health training received by their employees is beneficial to them in the event of an OSHA inspection, and they will appreciate the fact that the employee holds a certificate and your institution maintains records to verify that training. Employers also will feel more confident about the safety of their workplaces when they hire people who already possess positive safety and health attitudes.

Three factors normally determine the credibility of the certificate:

- Reputation of the issuing institution.
- Instructor.
- Content of materials used during the course of study.

For safety and health instruction, a fourth factor must be considered; namely, the relationship of the content to federal safety and health regulations. All 50 JSHIM modules were designed to enable the student to recognize safety and health hazards and to understand the fundamental aspects of compliance with federal health and safety requirements. While the Occupational Safety and Health Administration (OSHA) does not certify training programs, OSHA representatives have been active on the nationally-based advisory committee formed to guide this project, and they have reviewed each of the 50 modules and have made constructive suggestions that have been incorporated.

The Center for Occupational Research and Development has attempted to structure the content of the materials to be accurate and relevant to current safety practices and regulations. The institution and the instructor who provide the training must be responsible for certifying that the information was accurately presented and that the student achieved the desired level of competency (80% mastery of objectives).

When an institution purchases modules from CORD, the same number of certificates as sets of modules will be sent to the institution. These certificates will require the signatures of two people; the faculty member who presents the instruction and the administrator of the institution. The certificate will state that the student has satisfactorily completed a particular number of hours of instruction in safety and health and will be presented to each student who successfully completes the training. A facsimile of the certificate is shown in Figure 1.

_____

(Student's Name)

has successfully completed ____ hours of instruction in

JOB SAFETY AND HEALTH

conducted at

_____

(Institution)

Curriculum materials prepared by

CORD The Center for Occupational Research and Development

_____

Instructor

_____ _____

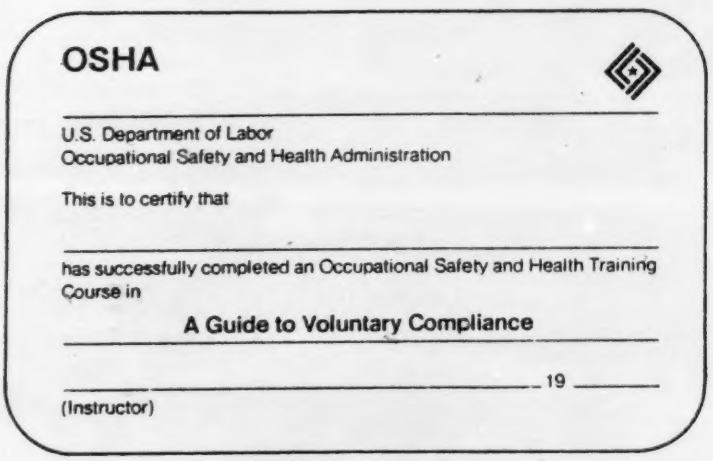
Date Administrator

Figure 1. Facsimile of safety and health training certificate.

Your institution may wish to be able to present official wallet-sized OSHA certificates to students who complete your training course. This is possible if the instructor has received training from the Occupational Safety and Health Training Institute located at 1555 Times Drive, Des Plaines, IL 60018. The OSHA Training Institute serves mainly to train compliance officers, but the following three courses are available to the general public free of charge.

- A Guide to Voluntary Compliance (for instructors).
- Basic Instructor Course in Occupational Safety and Health Standards for the Construction Industry.
- Intermediate Guide to Voluntary Compliance in the Health Area.

These courses are offered several times annually. The certificate available for your students is shown in Figure 2.


OSHA

U.S. Department of Labor
Occupational Safety and Health Administration

This is to certify that

_____

has successfully completed an Occupational Safety and Health Training Course in

A Guide to Voluntary Compliance

_____ 19 _____

(Instructor)

Figure 2. Official certificate from OSHA Training Institute.

APPENDIX A

JOB SAFETY AND HEALTH INSTRUCTIONAL MATERIALS
MODULE TITLES

JOB SAFETY AND HEALTH INSTRUCTIONAL MATERIALS
MODULE TITLES

SH-01 Materials Handling
SH-02 The Role of OSHA in Safety and Health
SH-03 Fundamentals of Electrical Safety
SH-04 First Response to Medical Emergencies
SH-05 Fire Prevention and Emergency Procedures
SH-06 Walking and Working Surfaces
SH-07 Safety Signs, Tags, and Color Codes
SH-08 Recognizing Job Health Hazards
SH-09 Recognizing Job Safety Hazards
SH-10 Structural Egress and Emergency Procedures
SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-15 Agribusiness Safety
SH-16 Material Hoist Safety
SH-17 Mechanized Off-Road Equipment Safety
SH-18 Safe Operation of Commercial Vehicles
SH-19 Safety with Hand and Portable Power Tools
SH-20 Precautions for Explosive Materials
SH-21 Marine and Longshoring Safety
SH-22 Ladder and Scaffolding Safety
SH-23 Warehousing Storage and Retrieval Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-27 Safety in Elevators and Grain Handling Facilities
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials

SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-35 Ionizing and Nonionizing Radiation Protection
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-37 Safety of Concrete, Forms, and Shoring
SH-38 Excavating, Trenching and Shoring Safety
SH-39 Steel Erection Safety
SH-40 Electrical Power Transmission and Distribution Safety
SH-41 Safety Practices for Demolition Procedures
SH-42 Safe Use of Powered Industrial Trucks
SH-43 Safety Practices for Commercial Diving
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-45 Coast Guard Regulations Applied to Offshore Drilling
SH-46 Chemical Hazards and Waste Disposal Safety and Health
SH-47 Safety and Health in Vocational Education
SH-48 OSHA Training Programs
SH-49 Establishing a Company Safety and Health Program
SH-50 Agricultural Chemical and Pesticide Hazards

APPENDIX B

MODULE SH–35
"IONIZING AND NONIONIZING RADIATION"

(see CE 031 492)